U.S. Department of Energy
Energy Efficiency and Renewable Energy
Bringing you a prosperous future where energy is clean, abundant, reliable, and affordable

Biomass Program

Thermochemical R&D

Direct Causticization for Black Liquor Gasification

Direct causticization (DC) is one of several possible processes that can be used to recover the pulping chemicals in black liquor. It has been shown that DC has several advantages to conventional lime-based recovery processes, including higher production of electricity, and a smaller amount of non-active chemicals in the white liquor which is recycled back to the digester or pulping stage. However, the chemical composition of the white liquor produced via DC differs from that of the lime-based processes and this could impact the pulping yield and pulp quality.

This project will evaluate advanced pulping technologies which utilize the white liquors produced by the combined technology of steam reforming and direct causticization of black liquor. It will also demonstrate that inclusion of direct causticization by TiO_2 in the MTCI/ThermoChem steam reformer can reduce or completely eliminate the energy-intensive lime cycle for black liquor gasification.

R&D Pathway

Pulping Studies: Researchers will conduct laboratory pulping studies to establish baseline data for conventional kraft linerboard, bleachable pulps from softwood, and bleachable pulps from hardwood. The effects of sulfidity as well as the addition of different sulfide compounds on pulp yield will be studied.

Direct Causticization Study: A process development unit will be designed, built, and used in the DC study. Researchers will determine the kinetics of DC by TiO_2 and subsequent leaching reactions to recover the pulping chemicals. The removal of non-process elements (Ca, Mn, Mg, Fe, Al) will also be studied.

Benefits

- **Improve the energy, environmental, and economic benefits of black liquor gasification**

Applications

Direct causticization offers the forest products industry an alternative to lime-based recovery processes, with the potential to save energy, reduce costs, and minimize environmental impacts.

Project Partners

Manufacturing and Technology Conversion International, Inc.
North Carolina State University
University of Maine

Project Period

FY 2003 – FY 2004

For more information contact:

Aaron Yocum
National Energy Technology Lab
Aaron.Yocum@netl.doe.gov

EERE Information Center
1-877-EERE-INF (1-877-337-3463)

Visit the Web site for the Office of the Biomass Program (OBP) at
www.eere.energy.gov/biomass.html

September 2004